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EXAMINER	
BRIER, JEFFERY A	
ART UNIT	**PAPER NUMBER**
2672	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	10/615,941	TAKEMOTO ET AL.
	Examiner	Art Unit
	Jeffery A Brier	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2003*.

2a)☐ This action is **FINAL.** 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Detailed Action

Preliminary Amendment

1. The preliminary amendment filed on 7/10/2003 has been entered.

Title

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Drawings

3. The drawings are objected to because:

In figure 5 step S5050 "5010" should be "2010" since paragraph 0045 describes virtual object 2010 not virtual object 5010 and since 5010 in figure 5 is a step and this step is not used in the distance determination of step 5050;

In figure 7 step S7010 describes 4 or more and paragraph 0064 describes 4 or more. It is not clear from figure 7 how step S7010 can determine more than 4 since it can only determine if 4 is present and then exists to step S7020;

In figure 11 step Sb010 describes 8 and paragraph 0080 describes 2 or more. It is not clear from figure 11 how step Sb010 can determine more than 2 since it can only determine if 2 is present and then exists to step Sb020;

In figure 13 2 elements are designated by the same reference number 2010'. It is possible applicant intended for 2010' to be d010'; and

In figure 14 e0 has no corresponding description in the Description of the Preferred Embodiments;

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3, 9, 15, and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 is indefinite because the does not clearly state the process that is occurring when applicant claims "translation transformation following the constraining shape". Similarly the process occurring when applicant claims "rotation transformation on an axis" since it does not claim which claimed element is rotated.

Claim 9 is indefinite because "the computer program" lacks antecedent basis in the claim.

Claim 15 is indefinite because "the computer program" lacks antecedent basis in the claim.

Claim 18 is very similar to claim 3 and this claim is indefinite for the reasons given for claim 3.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshifumi Kitamura and Fumio Kishino, Consolidated Manipulation of Virtual and Real Objects, September 1997, Proceedings of the ACM symposium on Virtual reality software and technology, pages 133-138. Kitamura teaches an augmented reality

system that uses object constraints to control the visual interaction between the virtual objects and the real objects.

A detailed analysis of the claims follows.

Claim 1:

Kitamura teaches an information processing device for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said device comprising:

image-taking means for taking images in real space in order to display the said virtual object in a superimposed manner on real space (*The three paragraphs found in section 2 on page 134 of Kitamura teaches image taking means: measuring the real objects, using a range image, using stereo images, or graphical images generated from the geometric shapes.*);

synthesizing means for synthesizing a virtual object with the said taken image (*The introduction on page 133 second full paragraph discusses augmented reality which synthesizes a virtual object with a taken real object.*);

operating means for controlling the position and orientation of the said virtual object (*The first paragraph in section 5 on page 135 describes the user using a 6 DOF tracker device to manipulate the virtual objects.*); and

aiding means for obtaining a three-dimensional position of real space from external instructions (*For example Kitamura discusses in section 2 in the first paragraph using conventional modeling software after precisely measuring the size or length of the real object by hand. Measuring by hand generates external instructions. Another source of external instructions is the range image or stereo image obtained by multiple cameras described also in section 2 first paragraph.*), and obtaining a constraining shape for aiding in control operations for the position and orientation of the said virtual object (*The shape generated from the external instructions constraints the interaction of the virtual object with the real object, see sections 5.1 to 5.4.*);

wherein the position and orientation of the said virtual object are controlled_ by instructions from said operating means, based on constraint conditions based on the constraining shape obtained by said aiding means (*The shape of the real objects are used to constrain the movement of the virtual object by giving the real object a shape that the virtual object interacts with in a constrained manner. Sections 5.1 to 5.4 discusses manipulation of the virtual object based upon constraint conditions based on the shape of the real object.*).

Claim 2:

Kitamura teaches an information processing device according to Claim 1, wherein the constraining shape is a shape in which a three-dimensional position in real space (*Section 2 first paragraph discusses 3D shapes.*) obtained by external instructions (*Section 2 first paragraph discusses determining the 3D shapes by hand or by multiple cameras.*) is configured of an apex (*The phrase an apex is singular and is met at least by taking in points of the real object by hand.*) or a component plane (*On page 136 in the text above figure 2 determining a plane and using the plane to constrain movement of the virtual object is discussed with regards to figure 2.*).

Claim 3:

Kitamura teaches an information processing device according to Claim 1, wherein the following control operations of the position and orientation of the said virtual object can be made using said operating means:

translation transformation following the constraining shape (*See figures 4(a) and 5.*); and

rotation transformation on an axis which is a normal vector at a plane where the constraining shape and the virtual object come into contact (*After the virtual object is snapped on to the face of the real object the virtual objects motion is constrained to translation on the real object's surface and to rotation on the real object's surface, see the first full paragraph on*

page 135 in section 5.1 and the first full paragraph on page 137 above section 5.3.2.).

Claim 4:

Kitamura teaches an information processing device according to Claim 1, wherein the virtual object is subjected to three-dimensional transformation by control operations of said operating means (*The 6DOF manipulator controls the movement of the virtual object in three dimensions.*), such that the position of said operating means on a two-dimensional screen (*Kitamura's article was published in 1997, in the year 1997 most display were two dimensional, thus, Kitamura's augmented reality is displayed on a two dimensional screen.*) and the position of the said virtual object on a two-dimensional screen are synchronized (*The 6DOF manipulator is synchronized with the virtual object since it controls the position of the virtual object on the two dimensional screen.*).

Claim 5:

Kitamura teaches an information processing method for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said method comprising:

a measurement step obtaining external parameters indicating the position and orientation of image-taking means in order to fixedly display the virtual object in real space (*The three paragraphs found in section 2 on page 134 of Kitamura teaches*

image taking means: measuring the real objects, using a range image, using stereo images, or graphical images generated from the geometric shapes. Measuring the real objects determines the position and orientation of image-taking means since the position of the hand held unit's position and orientation are used to calculate the position of the real objects in the augmented reality scene. The range image and stereo images inherently provide position and orientation of the multiple cameras in order to calculate the position of the real objects in the augmented reality scene. These external parameters determines the position of the virtual object at least due the shape based constraints generated from these external parameters.);

an operating step for controlling the position and orientation of the virtual object (*The first paragraph in section 5 on page 135 describes the user using a 6 DOF tracker device to manipulate the virtual objects.*);

an aiding step for adding constraints to the control operations of an operating means so as to aid the control operations on the virtual object (*The shape generated from the external instructions constraints the interaction of the virtual object with the real object, see sections 5.1 to 5.4.*);

an input step for inputting a constraining shape to be a reference for generating the constraints (*The shape of the real objects are input as discussed in section 2. The input shapes are used to constrain the movement*

of the virtual object. Sections 5.1 to 5.4 discusses manipulation of the virtual object based upon constraint conditions based on the shape of the real object.):

a synthesizing step for synthesizing pictures of real space obtained by image-taking means, and pictures of the said virtual object estimated from the position and orientation of the said image-taking means (*The introduction on page 133 second full paragraph discusses augmented reality which synthesizes a virtual object with a taken real object.*);

wherein the position and orientation of the said virtual object in said operating step is transformed in said aiding step with the constraining shape as a reference, thereby aiding control operations (*The shape of the real objects are used to constrain the movement of the virtual object by giving the real object a shape that the virtual object interacts with in a constrained manner. Sections 5.1 to 5.4 discusses manipulation of the virtual object based upon constraint conditions based on the shape of the real object.*).

Claim 6:

Kitamura teaches an information processing method according to Claim 5, wherein said input step obtains three-dimensional position in real space from external instructions (*For example Kitamura discusses in section 2 in the first paragraph using conventional modeling software after precisely measuring the size*

or length of the real object by hand. Measuring by hand generates external instructions. Another source of external instructions is the range image or stereo image obtained by multiple cameras described also in section 2 first paragraph.).

Claim 7:

Kitamura teaches an information processing method according to Claim 6, wherein a virtual image indicating the input virtual shape is synthesized with an image of the said real space and pictures of the said virtual object (*See the discussion of claim 6. Also refer to figure 2, 4(a), 5, and 6(a).*).

Claim 8:

Kitamura teaches a computer program, wherein the information processing method according to Claim 5 is executed by a computer device (*This article is directed to computers that generate the augmented reality scene since it was published by ACM for a symposium on virtual reality software and technology and since at page 133 in the last sentence in the second paragraph of section 1 software/hardware is discussed.*).

Claim 9:

Kitamura teaches a computer-readable recording medium, storing the computer program according to Claim 8 (*Software causing a computer to perform*

Kitamura's augmented reality is inherently stored in a computer readable recording medium.).

Claim 10:

Kitamura teaches an information processing method for controlling the position and orientation of a virtual object in compounded real space obtained by synthesizing pictures of real space and a virtual object, said method comprising:

a step for obtaining a constraining shape serving as constraint conditions, from a plurality of positions in real space instructed by a user using an operating unit capable of obtaining three-dimensional information (*The three paragraphs found in section 2 on page 134 of Kitamura teaches image taking means for obtaining 3D shape of real objects: measuring the real objects, using a range image, using stereo images, or graphical images generated from the geometric shapes. Kitamura discusses in section 2 in the first paragraph using conventional modeling software after precisely measuring the size or length of the real object by hand. Measuring by hand generates external instructions. Another source of external instructions is the range image or stereo image obtained by multiple cameras described also in section 2 first paragraph. The shape of the real objects are used to constrain the movement of the virtual*

object by giving the real object a shape that the virtual object interacts with in a constrained manner.);

a step for changing the position and orientation of the said virtual object according to instructions from the user, with the obtained constraining shape as constraint conditions (*The first paragraph in section 5 on page 135 describes the user using a 6 DOF tracker device to manipulate the virtual objects. The shape of the real objects are used to constrain the movement of the virtual object by giving the real object a shape that the virtual object interacts with in a constrained manner. Sections 5.1 to 5.4 discusses manipulation of the virtual object based upon constraint conditions based on the shape of the real object. The shape generated from the external instructions constraints the interaction of the virtual object with the real object, see sections 5.1 to 5.4.*); and

a step for synthesizing an image of virtual object generated according to the changed position and orientation, with pictures of real space (*The introduction on page 133 second full paragraph discusses augmented reality which synthesizes a virtual object with a taken real object. Section 5.1 discusses after movement is detected by the 6DOF manipulator the virtual object is moved according to the constraints.*).

Claim 11:

Kitamura teaches an information processing method according to Claim 10, wherein a virtual image indicating the input virtual shape is synthesized with the pictures of real space (*See the discussion of claim 10. Also refer to figure 2, 4(a), 5, and 6(a).*).

Claim 12:

Kitamura teaches an information processing method according to Claim 10, wherein the constraining shape is a plane (*On page 136 in the text above figure 2 determining a plane and using the plane to constrain movement of the virtual object is discussed with regards to figure 2.*).

Claim 13:

Kitamura teaches an information processing method according to Claim 10, wherein change of the position and orientation of the virtual object is carried out by changing the position and orientation of the operating unit (*The 6 DOF tracker is an operating unit. The user using the 6 DOF tracker device manipulates the virtual objects.*).

Claim 14:

Kitamura teaches a computer program, wherein the information processing method according to Claim 10 is executed by a computer device (*This article is directed to computers*

that generate the augmented reality scene since it was published by ACM for a symposium on virtual reality software and technology and since at page 133 in the last sentence in the second paragraph of section 1 software/hardware is discussed.).

Claim 15:

Kitamura teaches a computer-readable recording medium, storing the computer program according to Claim 14 (*Software causing a computer to perform Kitamura's augmented reality is inherently stored in a computer readable recording medium.*).

Claims 16-19:

Claims 16-19 are device claims that correspond to device claims 1-4 with the difference being that device claim 1-4 included means plus function language and device claims 16-19 lack the mean plus function terminology. Device claims 16-19 replaced the word means with the word unit.

Claim 16:

Kitamura teaches an information processing device for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said device comprising:

an image-taking unit for taking images in real space in order to display the virtual object in a superimposed manner on real space (*The three paragraphs found in section 2*

on page 134 of Kitamura teaches image taking unit: measuring the real objects, using a range image, using stereo images, or graphical images generated from the geometric shapes.);

a synthesizing unit for synthesizing a virtual object with the taken image (*The introduction on page 133 second full paragraph discusses augmented reality which synthesizes a virtual object with a taken real object in a unit of the augmented reality system.*);

an operating unit for controlling the position and orientation of the virtual object (*The first paragraph in section 5 on page 135 describes the user using a 6 DOF tracker device to manipulate the virtual objects. The 6 DOF tracker and associated means is a unit of the augmented reality system.*); and

an input unit for obtaining a three-dimensional position of real space from external instructions (*For example Kitamura discusses in section 2 in the first paragraph using conventional modeling software after precisely measuring the size or length of the real object by hand. Measuring by hand generates external instructions. Another source of external instructions is the range image or stereo image obtained by multiple cameras described also in section 2 first paragraph. The means for obtaining the position is a unit of the augmented reality system.*), and obtaining a constraining shape for aiding in controlling the position and orientation of the virtual object (*The shape generated from*

the external instructions constraints the interaction of the virtual object with the real object, see sections 5.1 to 5.4. This means for obtaining the position and constraining shape is a unit of the augmented reality system.);

wherein the position and orientation of the virtual object are controlled by instructions from said operating unit, based on constraint conditions based on the constraining shape obtained by said input unit (*The shape of the real objects are used to constrain the movement of the virtual object by giving the real object a shape that the virtual object interacts with in a constrained manner. Sections 5.1 to 5.4 discusses manipulation of the virtual object based upon constraint conditions based on the shape of the real object.*).

Claim 17:

This claim is identical to claim 2 and it is rejected for the reasons given for claim 2. See the discussion of claim 2.

Claim 18:

This claim is substantially identical to claim 3 with the exception this claim claims "operating unit". As stated for claim 16 the operating unit is the 6 DOF tracker and associated means. Thus, claim 18 is rejected for the reasons given for claim 3. See the discussion of claim 3.

Claim 19:

This claim is substantially identical to claim 4 with the exception this claim claims "operating unit". As stated for claim 16 the operating unit is the 6 DOF tracker and associated means. Thus, claim 19 is rejected for the reasons given for claim 4. See the discussion of claim 4.

Prior Art

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sauer et al., U.S. Patent Application Publication No. 2002/0140709, teaches an augmented reality system that constrains the movement of the virtual object by placing virtual guides in the augmented scene.

Bimber, U.S. Patent No. 6,803,928, teaches an augmented reality system that simulates the interaction between real and virtual objects, column 22 lines 30-35.

Blaine Bell, Steven Feiner, and Tobias Hollerer, View Management for Virtual and Augmented Reality, 2001, Proceedings of the 14th annual ACM symposium on User interface software and technology, pages 101-110, teaches an augmented reality system that uses object constraints to control the layout and transparency of objects.

Daniel G. Aliaga, Virtual Objects in the Real World, 1997, Communications of the ACM, pages 49-54, teaches an augmented reality system that determines the locations of static real world objects in order to create convincing interactions between the virtual objects and the real world objects.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffery A Brier whose telephone number is 703-305-4723. The examiner can normally be reached on M-F from 6:30 to 3:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi, can be reached at (703) 305-4713). The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeffery A. Brier

Jeffery A Brier
Primary Examiner
Art Unit 2672